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EXAMINER	
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 20040512

Application Number: 09/773,704
Filing Date: January 31, 2001
Appellant(s): JONES ET AL.

Trop, Pruner & Hu, P.C.
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 04/22/2004.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

Appellant's brief includes a statement that certain set of claims do stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8). (Refer to VI. Issues and VII. Groupings of the Claims in the Appeal Brief for further details).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5714874	Bonnefoy	02-1998
6214484	Hauer	04-2001
20020076588	Singh et al	06-2002
EP 0782209	Bohrer et al	07-1997

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

This rejection is set forth in prior Office Action:

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-4 and 6 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bonnefoy 5714874.

Regarding claims 1-4:

Bonnefoy discloses a fuel cell voltage generator wherein the voltage generator is to be connected to a current load; a fuel cell for generating electrical energy to be used by the current load; a storage battery having and control means for modifying a maximum intensity value of the current flowing through the dc converter in accordance with a voltage measured at the terminals of the fuel cell to keep said voltage within a predetermined range, at which a power output of the fuel cell is maximum (claims 1, 2, 5-6). It is further disclosed that if the load requires an electric power lower than the one available at the fuel cell, the battery takes profit from the excess of the electric energy (col 2, lines 58-60). It is also disclosed that this invention aims at supplying a voltage generator in which the fuel cell is kept continuously in optimal working conditions, regardless of the load demand, the fuel cell supplies continuously a maximum electric power (col 1, lines 35-40). Since Bonnefoy teaches the working principle of the fuel cell generator, his teachings thus encompasses the operating method.

It is further disclosed that the control block is divided in two parts, a firs part, grouping all the means necessary for the working control of the fuel cell such as hydrogen supply (mass of fuel), its temperature control and etc, and comprising the control means of the converter (col 2, lines 40-45). It is further taught that as the fuel cell begins to generate enough electric power, it

replaces progressively the battery so as to become the only energy source of the generator, it then also supplies the control block (col 2, lines 54-57).

As to the method limitation of "determining whether to route at least some of the power produced by the fuel cell stack and not consumed by the first load" and "selectively routing said at least some of the power produced by the fuel cell stack and not consumed by the first load to the second load", since the prior art (Bonnefoy'874) teaches that "if the load 4 requires an electric power lower than the one available at the fuel cell terminals, the battery takes profit from the excess of electric energy and recharges" (Bonnefoy'874 at col 2, lines 58-60):

If the load 4 requires an electric power lower than the one available at the fuel cell 1 terminals, the battery takes profit from the excess of electric energy and recharges.

it is therefore asserted that having shown that Bonnefoy'874 teaches routing automatically electric power to a battery (the second load), the above-mentioned characteristic, property and/or function [i.e. 1)"determining whether to route at least some of the power produced by the fuel cell stack and not consumed by the first load" and "selectively routing said at least some of the power produced by the fuel cell stack and not consumed by the first load to the second load" as well as 2)"determining whether the second load-battery is capable of receiving said power produced but not consumed"] is thus inherent as the step or methodology recited in the reference is substantially identical to that of the claims, and therefore, claimed properties, characteristics or functions are presumed to be inherent (MPEP 2112. Requirements of Rejection Based on Inherency). Thus, the prior art's method of operating the fuel cell seems to be identical except that the prior art is silent as to an inherent function, property and/or characteristic. In that, it is noted that the extrinsic evidence makes clear that the missing descriptive matter is necessarily

present in method of operating the fuel cell described in the reference, and that it would be so recognized by persons of ordinary skill.

In this regard, the examiner further likes to explain that while the term "automatically" might imply that it is acting or done spontaneously, such term "automatically", for instance, also implies having a self-acting or self-regulated mechanism. That is to say, a state or condition in which activity or behavior (of system) is regulated automatically in a predetermined manner. Accordingly, it is understood that while the method of the prior art can be performing steps automatically, there must exist a discriminating sequence (order), or operational subroutine or programmable succession in which such steps are strictly required to be performed based on pre-set operating conditions which are necessitated as to obtaining a continuing, adequate and satisfactory fuel cell functionality without affecting the overall system performance, and inherently, its method of operation. Hence, the automatic step of the prior art inherently includes determining or discriminating steps and/or conditions. Thus, the burden is shifted to applicants to provide objective evidence demonstrating the claimed method is necessarily different from the prior art's method, and that the difference is unobvious.

Additionally and for the reasons of record: it is also noted that applicants has admitted that "Bonnefoy teaches automatically routing electric power to a battery in the event of a deficiency between the power that is consumed by the load 4 and the power that is available at fuel cell terminals" (refer to the appeal brief, paragraph bridging page 14-15). It is also noted that applicants continue to admit that "the circuitry of Bonnefoy may have been designed at some point in response to some determination of how the circuit should behave when power to the load decreases" (emphasis added) (refer to the appeal brief, paragraph bridging page 15-16). Thus,

such determining and selective routing necessarily flow from the teachings of the prior art, i.e. Bonnefoy'874.

As to claim 6:

It is disclosed that the control means includes means for measuring the voltage at the terminals of the fuel cell, and wherein the control means respectively increments and decrements the maximum intensity value of the current following through the dc converter when the voltage measured of the fuel cell is above and below said predetermined range; wherein said predetermined range corresponds to a voltage range at which a power output of the fuel cell is maximum (claims 3-4). It is also made known that, in practice, the reference value of the voltage at the fuel cell is determined as being the point of the voltage/current characteristic of the fuel cell corresponding to a maximum power output in normal working conditions of the fuel cell (col 1, lines 59-63).

Therefore, the claims are anticipated by Bonnefoy'874. However, if the claims are not anticipated the claims are obvious as it has been held similar processes claimed in terms of its function, property and/or characteristic are obvious. In re Best 195 USPQ 430 and In re Fitzgerald 205 USPQ 594. See rationale and/or technical reason above to reasonably support the determination that the inherent function and/or characteristic necessarily flows from the teaching of the applied prior art.

5. Claims 5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bonnefoy 5714874 as applied above to claims 4 and 6, and further in view of the European publication EP 782209.

Bonnefoy is applied, argued and incorporated herein for the reasons above. However, Bonnefoy does not expressly disclose regulating a terminal voltage of the battery and having the specific fuel flow decreased.

As for claims 5 and 7:

The EP'209 publication teaches a supply system with fuel cells and a buffer in which the fuel cell has an output voltage lower than the voltage of the buffer battery (claim 2). It is also disclosed that the this enable the power delivered by the fuel cells to the load to be controlled simply, precisely and effectively without need to control the voltage output in any way in order to adjust it to the voltage actually present at the terminals of the battery and to the load requirement (page 4, lines 18-23). It is further taught that since the voltage pulses applied to the primary cannot exceed the minimum voltage output by the fuel cell and the maximum battery voltage is greater, it is necessary that the ratio between the maximum battery voltage and the minimum voltage delivered by the fuel cell is preferably of the order to twice the ratio between the mean value of the battery voltage and the mean value of the voltage delivered by the fuel cells. (page 4, lines 24-29).

It is also disclosed that for power values greater than a specific maximum power that can be delivered by the fuel cell power, the power delivered by the fuel cell is kept constant and equal to the specific maximum power so as to make a maximum contribution to the load requirement. For load power less than the specific maximum, the power delivered by the fuel cell is made to depend upon the charge state of the battery; in particular, if the battery voltage indicates a fully charged condition, the power delivered by the cell is equal to the load power; if the battery voltage is lower than thus indicates a partial charge condition, the regulation band is

proportional and is displaced in accordance with the lower voltage so as to deliver a recharging power to the battery (page 6, lines 19-35). The portions of the regulation characteristics which are disposed indicate that the power for recharging the battery is the accumulation of a negative load power (recovered from the load) and a power delivered by the fuel cell, which vary inversely maintaining a predetermined and constant recharging power which depends upon the battery voltage and hence upon its charge condition (page 6, lines 30-35).

In view of these disclosures, it would have been obvious to one skilled in the art at the time the invention was made to both regulate a terminal voltage of the battery and have the specific fuel flow decreased of the EP'209 publication in the method of operating the fuel cell of Bonnefoy because the EP'209 publication discloses that this enable the power delivered by the fuel cells to the load to be controlled simply, precisely and effectively without need to control the voltage output in any way in order to adjust it to the voltage actually present at the terminals of the battery and to the load requirement. Accordingly, it solves a technical problem and provides a supply system with fuel cells and a buffer battery in which a highly efficient, very safe and extremely simply electronic regulation system forms the interface and ensures optimal performance of the drive system, particularly, it limits the current of the fuel cells to a maximum permitted design value; it regulates the power delivered by the fuel cells in dependence on the charge state of the batteries and on the power required by the load; it limits the rate of increase of the power delivered by the cells to permissible values; and it adjusts the voltage output by the fuel cells to a higher battery voltage.

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bonnefoy 5714874 in view of the European publication EP 782209 as applied to claim 1 above, and further in view of Hauer 6214484.

Bonnefoy and the EP'209 publication are applied, argued and incorporated herein for the reasons above. In addition, the foregoing prior art fails to disclose the fuel processor to provide the fuel flow.

Hauer teaches a fuel cell arrangement having a fuel cell stack, a methanol reformer (fuel processor) wherein the fuel cell stack is connected with an electrical energy storage device (abstract).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use a fuel processor (reformer) to provide fuel to the fuel cell method of Bonnefoy and the EP'209 publication as Hauer teaches that the fuel processor converts raw fuel into reformed hydrogen which is the specific fuel employed to generate electrical energy from a fuel cell system. As it is conventionally known in the art, very efficient fuel cells use pure hydrogen for fuel; and pure hydrogen, has traditionally been difficult to handle and relatively expensive to store and distribute. Consequently, fuel processors process and provide the required hydrogen rich gas mixtures from reforming of various hydrocarbons fuels which are expected to be utilized in fuel cell systems.

7. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bonnefoy 5714874 in view of the European publication EP 782209 as applied to claim 1 above, and further in view of Singh et al US2002/0076588.

Bonnefoy and the EP'209 publication are applied, argued and incorporated herein for the reasons above. In addition, the foregoing prior art fails to disclose routing some power to an oxidizer.

Singh et al disclose a fuel cell system providing means for oxidizing heated reformed fuel gas in fuel cell during transient load conditions (section 0009). It is disclosed that the electrical storage device is capable of electrochemically oxidizing a quantity of reformer gas contained within an anode chamber of the fuel cell during transient load conditions by charging from a preset state of charge towards full capacity (abstract).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to route power to an oxidizer in fuel cell system of Bonnefoy and the EP'209 publication as taught by Singh et al as it is apparent that the routed power is to operate the means for oxidizing during transient load conditions that prevent transient increases in the combustion anode gas during changes in electrical load demand. Accordingly, the energy storage device thereby prevents large quantities of unoxidized reformer gas from entering a chamber of a combustor during transient load conditions, unoxidized reformer gas that generates tremendous amount of heat when burned that can corrode or damage the combustor. Thus, the energy storage device discharges the excess charge when the fuel cell power generation system returns to normal load conditions or during transient load conditions when the amount of reformer gas entering the anode chamber has been reduced so that the amount of unoxidized reformer gas entering the combustor is maintained at nearly constant level.

(11) Response to Argument

Applicant's arguments have been fully considered but they are not persuasive in overcoming the rejection.

The main contention of applicants' arguments is premised on the assertion that the prior art of record fails "to teach the specific limitation such as "the determining and selective routing of claim 1". In this regard, the examiner contends that since the prior art (Bonnefoy'874) teaches that "if the load 4 requires an electric power lower than the one available at the fuel cell terminals, the battery takes profit from the excess of electric energy and recharges" it is therefore asserted that having shown that Bonnefoy'874 teaches routing automatically electric power to a battery (the second load), the above-mentioned characteristic, property and/or function [i.e. 1)"determining whether to route at least some of the power produced by the fuel cell stack and not consumed by the first load" and "selectively routing said at least some of the power produced by the fuel cell stack and not consumed by the first load to the second load" as well as 2)"determining whether the second load-battery is capable of receiving said power produced but not consumed"] is thus inherent as the step or methodology recited in the reference is substantially identical to that of the claims, and therefore, claimed properties, characteristics or functions are presumed to be inherent (MPEP 2112. Requirements of Rejection Based on Inherency). Thus, the prior art's method of operating the fuel cell seems to be identical except that the prior art is silent as to an inherent function, property and/or characteristic. In that, it is noted that the extrinsic evidence makes clear that the missing descriptive matter is necessarily present in method of operating the fuel cell described in the reference, and that it would be so

recognized by persons of ordinary skill. Thus, such determining and selective routing necessarily flow from the teachings of the prior art, i.e. Bonnefoy'874.

In this respect, particularly to the specific determining including determining whether to route at least some of the power produced by the fuel cell stack and not consumed by the first load to a second load as set forth in claim 1, determining whether the second load is capable of receiving some of the power produced as recited in claim 2, or determining whether the battery is capable of being charged as recited in claim 3, or the selectively routing comprising selectively charging the battery as recited in claim 4 or decreasing the fuel flow in response to the detection of the decrease, the examiner likes to point out that the prior art clearly discloses that "If the load 4 requires an electric power lower than the one available at the fuel cell 1 terminals, the battery takes profit from the excess of electric energy and recharge" (Bonnefoy COL 2, lines 58-60) and "disconnecting the fuel cell in case the voltage V at the terminals of the latter stays below the minimum value required for the proper working of the said cell, in spite of the power regulation realized by the d.c. converter. Interrupting the working of the fuel cell in case the voltage at the batteries terminal is too high or too weak" (Bonnefoy COL 4, lines 1-7) and "Possibly, one or more voltage or additional current regulators may be used in series with the load or the battery in order to be able to control the electric power received by these apparatus according to the type of application" (Bonnefoy COL 4, lines 10-13). In light of this disclosure, it is contended that the prior art implicitly teaches the step of determining whether to selectively route the power produced but not consumed (the excess energy) to the battery (the second load) as well as determining if the battery has the capacity to be charged because failing to do that inherent step will cause the battery and the whole fuel cell system to explode, and thus, it will cause

detrimental effect to the whole system. Stated somewhat differently, a fuel cell system is a system for generating electrochemical energy (producing power) wherein the generated energy (produced power) is to be consumed by a load(s) connected thereto, consequently, absent any discriminating/determining step for positively determining whether the load(s) is capable of receiving produced power from the fuel cell so as to selectively route produced power, power produced but not consumed and/or any remaining power produced by the fuel cell stack but not consumed by a load(s) will definitely cause the electrochemical generating system and its power consuming load(s) to burst or explode in a catastrophic manner due to an overproduction of excess power and misrouting determination of unused power. It is further contended that when a load is 100 % fully charged or fully energized, said load is not able to receive or consume more power (energy) because otherwise said load would become overcharged, over-energized or overpowered, and therefore, such overcharged, over-energized or overpowered state of the load will absolutely set forth propitious and favorable conditions for an explosion due to sudden increase in the energy/power level. Succinctly stated, when any load (e.g. battery) has reached its maximum level of energy/power consumption to become 100 % fully charged or energized, no more energy/power can be routed or supplied thereto because the load itself along with the fuel cell system will explode. As result, it is asserted that Bonnefoy's fuel cell system must necessarily determine whether to selectively route power/energy to the load (i.e. battery) by considering the load's capability to receive more power or being charged. As a consequence, the foregoing limitations necessarily flow from the teachings of the reference.

Additionally and for the reasons of record: it is also noted that applicants has admitted that "Bonnefoy teaches automatically routing electric power to a battery in the event of a

deficiency between the power that is consumed by the load 4 and the power that is available at fuel cell terminals" (refer to the appeal brief, paragraph bridging page 14-15). It is also noted that applicants continue to admit that "the circuitry of Bonnefoy may have been designed at some point in response to some determination of how the circuit should behave when power to the load decreases" (emphasis added) (refer to the appeal brief, paragraph bridging page 15-16). Thus, such determining and selective routing necessarily flow from the teachings of the prior art, i.e. Bonnefoy'874.

Moreover, the examiner further likes to explain that while the term "automatically" might imply that it is acting or done spontaneously, such term "automatically", for instance, also implies having a self-acting or self-regulated mechanism. That is to say, a state or condition in which activity or behavior (of system) is regulated automatically in a predetermined manner. Accordingly, it is understood that while the method of the prior art can be performing steps automatically, there must exist a discriminating sequence (order), or operational subroutine or programmable succession in which such steps are strictly required to be performed based on pre-set operating conditions which are necessitated as to obtaining a continuing, adequate and satisfactory fuel cell functionality without affecting the overall system performance, and inherently, its method of operation. Hence, the automatic step of the prior art inherently includes determining or discriminating steps and/or conditions. Thus, the burden is shifted to applicants to provide objective evidence demonstrating the claimed method is necessarily different from the prior art's method, and that the difference is unobvious.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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